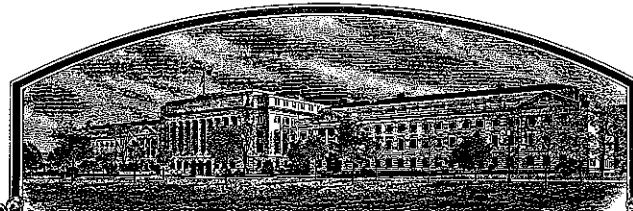


No.

200200095



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

USA-ARS

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HERETO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR SPLITTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE PURPOSES, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

RICE

'Bolivar'

In Testimony Whereof, I have hereunto set my hand  
and caused the seal of the Plant Variety  
Protection Office to be affixed at the City of  
Washington, D.C. this twenty-first day of  
March, in the year two thousand and five.

Attest:

Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

Secretary of Agriculture

**APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE**  
(Instructions and information collection burden statement on reverse)

1. NAME OF OWNER USDA-ARS		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME TX5012	3. VARIETY NAME Bolivar
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) USDA-ARS 1509 Aggie Drive Beaumont, TX 77713		5. TELEPHONE (include area code) 409-752-5221 x2234	FOR OFFICIAL USE ONLY PVPO NUMBER <i>200200095</i>
		6. FAX (include area code) 409-752-5720	FILING DATE <i>2/8/02</i>
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) U.S. Government Research Agency	8. IF INCORPORATED, GIVE STATE OF INCORPORATION	9. DATE OF INCORPORATION	FILING AND EXAMINATION FEES:  <b>FEES RECEIVED</b>  <i>\$ 2705.00</i> <b>DATE</b> <i>2/8/2002</i>
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Janie Hurley Technology Licensing Associate, Agriculture/Life Sciences Technology Licensing Office The Texas A&M University System 3369 TAMU College Station, TX 77843-3369		<b>CERTIFICATION FEE:</b>  <i>\$ 432.00</i> <b>DATE</b> <i>10/22/2004</i>	
11. TELEPHONE (Include area code) 979-847-8682	12. FAX (Include area code) 979-845-1402	13. E-MAIL jhurley@tamu.edu	14. CROP KIND (Common Name) Rice
15. GENUS AND SPECIES NAME OF CROP Oryza sativa		16. FAMILY NAME (Botanical) Gramineae	17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)		19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(e) of the Plant Variety Protection Act. <input checked="" type="checkbox"/> YES (If "yes", answer items 20 and 21 below) <input type="checkbox"/> NO (If "no", go to item 22)	
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,705), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)		20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
		21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, SPECIFY THE <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED NUMBER 1,2,3, etc. <i>(If additional explanation is necessary, please use the space indicated on the reverse.)</i>	
22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) FOR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U.S. OR OTHER COUNTRIES?		23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.			
The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.			
Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			

SIGNATURE OF OWNER

*Anna Myers McClung*

NAME (Please print or type)

Anna Myers McClung

SIGNATURE OF OWNER

NAME (Please print or type)

CAPACITY OR TITLE

DATE

CAPACITY OR TITLE

DATE

Supervisory Research Geneticist 1/23/02

**GENERAL:** To be effectively filed with the Plant Variety Protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable (*in the sense that it will reproduce an entire plant*) tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for \$2,705 (\$320 filing fee and \$2,385 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the *Regulations and Rules of Practice*.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. DO NOT use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office  
Telephone: (301) 504-5518  
FAX: (301) 504-5291

Homepage: <http://www.ams.usda.gov/science/pvpo/pvp.htm>

200200095

**ITEM**

- 18a. Give:  
(1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;  
(2) the details of subsequent stages of selection and multiplication;  
(3) evidence of uniformity and stability; and  
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:  
(1) Identify these varieties and state all differences objectively;  
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and  
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
19. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant MAY NOT reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See *Regulations and Rules of Practice, Section 97.103*.)
22. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
23. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

**21. CONTINUED FROM FRONT** (Please provide a statement as to the limitation and sequence of generations that may be certified.)

**22. CONTINUED FROM FRONT** (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

**23. CONTINUED FROM FRONT** (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

**NOTES:** It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the *Regulations and Rules of Practice*.)

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center-East, Beltsville, MD 20705. Telephone: (301) 504-8089. <http://www.ams.usda.gov/lsg/seed/ls-ed.htm>

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this collection of information is (0581-0055). The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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STD-470 (04-01) designed by the Plant Variety Protection Office with WordPerfect 6.0a. Replaces STD-470 (02-99) which is obsolete.

200200095

1

## 'BOLIVAR' RICE

Anna M. McClung  
USDA-ARS  
1509 Aggie Dr.  
Beaumont, TX 77713

'Bolivar' (*Oryza sativa L.*), an early maturing long-grain rice cultivar that is well suited for the parboiling and canning industries, was developed at the Texas A&M University System Agricultural Research and Extension Center at Beaumont, TX, by the USDA-ARS.

### Exhibit A. ORIGIN AND BREEDING HISTORY

Bolivar was developed from the cross 'Gulfmont\*2/Teqing' (cross number B8911A9), made at the Texas A&M University System Agricultural Research and Extension Center at Beaumont, TX in 1989. Gulfmont has been an important commercial long grain rice cultivar in the southern U.S. since its release in 1986. It is an early maturing semidwarf cultivar with excellent main and ratoon crop yield and milling quality. It has moderate resistance to the blast pathogen, *Pyricularia grisea*, due to the presence of two major resistance genes, *pi-d* and *Pi-K<sup>b</sup>*. Teqing is a semidwarf, medium grain cultivar from China that has high yield potential, very firm cooking quality, and superior resistance to blast and sheath blight diseases. The objective of the cross was to develop a cultivar similar to Gulfmont but having improved disease resistance and superior processing quality that is desired by the parboiling and canning industries. Bolivar was developed using a modified pedigree breeding scheme. Offspring of the cross were bulked in the F<sub>2</sub> and F<sub>3</sub> generations. This was followed by four generations of panicle to row selections for heading, height, grain shape, and tillering ability. A bulk of an F<sub>7</sub> row harvested in 1992 was evaluated in 1993 at Beaumont, TX in an unreplicated yield trial. The line was evaluated for yield, milling quality, height, heading, lodging, reaction to blast and sheath blight (causal organism *Rhizoctonia solani*) diseases in this trial. In 1994, seed from the 1993 yield plot was entered into the Texas statewide preliminary yield trials as entry 15 and was evaluated at Beaumont, Bay City, and Eagle Lake, TX. In these trials it was observed for yield, milling quality, height, heading, lodging, and reaction to blast and sheath blight diseases. In 1995, a bulk of the F<sub>10</sub> generation was entered into the 1995 Uniform Rice Regional Nursery (URRN) as entry 12 (designated RU9503012 or TX5012). It was evaluated in the URRN trials throughout the southern U.S. rice growing region (AR, TX, MS, LA, TX, and MO) and several locations within Texas from 1995 – 2000 for yield, milling quality, height, heading, maturity, lodging, and reaction to blast, narrow brown leaf spot (causal organism *Cercospora janseana*), and sheath blight diseases, as well as the physiological disorder, straighthead.

### SEED PURITY

Bolivar was derived from an F<sub>7</sub> panicle row selection (B8911A9-BK-234-5-1-2) that was then bulked for three generations. This F<sub>10</sub> generation became the source of 100 F<sub>11</sub> panicles that were selected for uniformity and planted as the first headrow purification. Subsequently, Bolivar underwent headrow purification for five more generations. A bulk of some 600 F<sub>16</sub> panicle rows served as the basis of headrow seed that was provided for foundation seed production in Beaumont, TX during 2001. Bolivar has been observed to be uniform and stable for the last three years.

True offtypes removed from the headrow fields during 1996-2000 were taller (2-4 inches) than the majority of the field. The total number of offtypes observed in the field was less than 1/5000 plants. There were no variants observed. The headrow field produced in Beaumont, TX during 2001 was highly uniform, lacking any offtypes or variants. Application for Plant Variety Protection is being implemented.

**Exhibit B. STATEMENT OF DISTINCTNESS****Dixiebelle is the cultivar that is most similar to Bolivar.**

- Bolivar is taller than Dixiebelle by about 7 cm (see also attached Table 1).

Statistical comparison of Bolivar versus Dixiebelle for height at four location-years in Texas

Year	Location	Cultivar	Height Mean cm	Height F Test	Height Prob. > F
1996	Beaumont, Tx	Bolivar	100.8	41.78	0.0030
		Dixiebelle	88.0		
1998	Eagle Lake, TX	Bolivar	86.8	12.13	0.0037
		Dixiebelle	81.4		
1999	Eagle Lake, TX	Bolivar	91.2	7.85	0.0187
		Dixiebelle	87.3		
2002	Bay City, Tx	Bolivar	97.7	16.64	0.0022
		Dixiebelle	91.2		

Comparison of Bolivar versus Dixiebelle for height (cm) across 41 tests.

Cultivar	Year	Number Locations	Height Mean	Height Minimum	Height Maximum	F-test Cultivars	Probability
Bolivar	1996	8	98.2	92.0	103.0	43.98	0.0003
	1996	8	89.8	85.0	93.0		
Bolivar	1997	7	91.7	85.0	96.0	26.27	0.0022
	1997	7	85.9	82.0	91.0		
Bolivar	1998	7	96.1	87.0	100.0	23.96	0.0027
	1998	7	85.9	80.0	95.0		
Bolivar	1999	7	93.9	90.0	98.0	14.19	0.0093
	1999	7	87.1	82.0	97.0		
Bolivar	2000	12	93.3	85.0	101.0	9.45	0.0106
	2000	12	87.2	79.0	97.0		
Bolivar	Overall Mean		94.6	87.8	99.6		
	Overall Mean		87.2	81.6	94.6		

Table 1. Mean plant height (cm) of Bolivar and selected check varieties at several Texas locations and in Louisiana, Arkansas, Missouri and Mississippi (1996-2000).

Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Bay City, TX	96	94	97	92	91	100	100
	Beaumont, TX	98	99	103	88	91	98	101
	El Campo, TX	87	91	68	85	84	94	92
	Eagle Lake, TX	101	96	98	91	88	99	99
	Ganado, TX	113	94	95	88	86	89	93
	Stuttgart, AR	98	100	103	93	90	92	100
	Crowley, LA	95	90	85	88	85	83	103
	Stoneville, MS	90	103	105	93	98	90	98
	Texas East	98	99	103	88	91	98	101
	Texas West	99	94	95	89	87	98	96
	Texas Mean	99	95	96	89	88	98	97
	Regional Mean	97	96	98	90	89	94	98
1997	Beaumont, TX	79	87	91	82	81	92	88
	El Campo, TX	78	90	97	87	86	97	90
	Eagle Lake, TX	90	93	90	86	85	96	96
	Ganado, TX	81	91	97	82	84	92	85
	Stuttgart, AR	96	93	89	90	87	100	95
	Stoneville, MS	89	90	93	83	86	103	93
	Crowley, LA	91	97	102	91	91	98	95
	Texas East	79	87	91	82	81	92	88
	Texas West	83	91	95	85	85	95	90
	Texas Mean	82	90	94	84	84	94	90
	Regional Mean	86	92	96	86	86	97	92
1998	Bay City, TX	92	98	99	95	96	101	99
	Beaumont, TX	104	100	106	91	94	105	89
	Eagle Lake, TX	83	87	85	82	85	83	87
	Ganado, TX	87	88	92	86	86	90	95
	Stuttgart, AR	98	91	98	80	86	98	100
	Stoneville, MS	106	103	10	86	93	111	100
	Crowley, LA	93	88	88	81	91	98	93
	Texas East	104	100	106	91	94	105	99
	Texas West	67	91	92	88	89	91	94
	Texas Mean	92	93	96	89	90	95	95
	Regional Mean	95	94	83	86	80	98	96
1999	Bay City, TX	95	101	103	87	89	104	98
	Beaumont, TX	88	86	88	82	79	90	90
	Eagle Lake, TX	87	93	96	97	95	100	94
	Ganado, TX	96	93	104	87	87	102	92
	Stuttgart, AR	95	88	95	86	78	100	96
	Stoneville, MS	90	93	102	86	85	103	93
	Crowley, LA	90	93	89	85	88	98	94
	Texas East	88	86	88	82	79	90	90
	Texas West	93	96	101	90	90	102	95
	Texas Mean	92	93	98	88	88	99	94
	Regional Mean	92	92	98	87	86	100	94
2000	Bay City, TX	91	93	95	89	.	99	97
	Beaumont, TX	104	99	99	93	.	106	101
	Eagle Lake, TX	88	83	86	81	.	89	90
	Ganado, TX	84	88	93	79	.	92	86
	Bay City, TX	95	93	103	87	89	104	98
	Beaumont, TX	88	84	88	82	79	90	101
	Eagle Lake, TX	87	95	96	97	95	100	89
	Ganado, TX	96	91	104	87	87	102	93
	Stuttgart, AR	97	92	92	89	86	96	98
	Stoneville, MS	91	88	99	87	87	101	85
	Crowley, LA	95	97	97	90	95	100	96
	Malden, MO	83	88	86	85	79	93	85
	Texas East	96	92	94	88	79	98	101
	Texas West	90	91	96	87	90	98	92
	Texas Mean	92	91	96	87	88	98	94
	Regional Mean	92	91	95	87	87	98	93
	GRAND Texas East	93	93	96	86	85	97	96
	GRAND Texas West	90	92	98	88	88	97	93
	GRAND Texas Mean	91	92	96	87	87	97	94
	GRAND Regional Mean	92	93	94	87	88	97	95

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- Bolivar is a very early maturing variety that averages 7 days earlier in flowering than Dixiebelle (see also attached Table 2).

Statistical comparison of Bolivar versus Dixiebelle for heading at four location-years in Texas

Year	Location	Cultivar	Heading Mean Days	Heading F Test	Heading Prob. > F
1996	Beaumont, Tx	Bolivar	73.5	14.67	0.0186
		Dixiebelle	79.0		
1998	Eagle Lake, TX	Bolivar	72.8	128.00	0.0001
		Dixiebelle	76.8		
1999	Eagle Lake, TX	Bolivar	74.0	961.00	0.0001
		Dixiebelle	84.3		
2002	Bay City, Tx	Bolivar	76.3	33.80	0.0044
		Dixiebelle	80.7		

Comparison of Bolivar versus Dixiebelle for days to heading across 40 tests.

Cultivar	Year	Number Locations	Heading Mean	Heading Minimum	Heading Maximum	F-test	Probability
Bolivar	1996	8	77.5	71.0	93.0	62.76	0.0001
Dixiebelle	1996	8	85.1	79.0	96.0		
Bolivar	1997	7	72.0	60.0	86.0	53.98	0.0003
Dixiebelle	1997	7	81.7	68.0	99.0		
Bolivar	1998	6	74.0	67.0	85.0	12.63	0.0163
Dixiebelle	1998	6	78.0	73.0	87.0		
Bolivar	1999	7	72.0	63.0	81.0	68.75	0.0002
Dixiebelle	1999	7	79.4	71.0	90.0		
Bolivar	2000	12	73.8	63.0	89.0	43.88	0.0001
Dixiebelle	2000	12	80.2	72.0	93.0		
Bolivar	Overall Mean		73.9	64.8	86.8		
Dixiebelle	Overall Mean		80.9	72.6	93.0		

- DNA analysis indicates that Bolivar possesses the *Pi-b* resistance gene like its parent, Teqing, which conveys improved resistance to blast disease as compared to its other parent, Gulfmont. (Figure 1)(see also attached Tables 9 and 10).

Table 2. Mean number of days to 50% heading for Bolivar and selected check varieties at several Texas locations and in Louisiana, Arkansas, Missouri and Mississippi (1996-2000).								
Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Bay City, TX	76	85	85	84	87	81	76
	Beaumont, TX	74	78	80	79	79	77	74
	El Campo, TX	84	91	93	94	96	93	85
	Eagle Lake, TX	73	78	79	79	83	78	71
	Ganado, TX	75	81	80	81	85	81	74
	Stuttgart, AR	78	84	84	87	89	81	75
	Crowley, LA	92	96	95	96	102	95	93
	Stoneville, MS	72	79	81	81	86	78	72
	Texas East	74	78	80	79	79	77	74
	Texas West	77	84	84	85	88	83	77
	Texas Mean	76	83	83	83	86	82	76
	Regional Mean	78	84	85	85	88	83	78
1997	Beaumont, TX	70	81	84	85	89	82	71
	El Campo, TX	69	81	81	77	86	73	72
	Eagle Lake, TX	71	81	81	80	83	76	70
	Ganado, TX	61	74	76	68	69	68	60
	Stuttgart, AR	75	85	85	84	89	83	72
	Stoneville, MS	73	83	83	79	85	82	73
	Crowley, LA	85	94	91	99	94	90	86
	Texas East	70	81	84	85	89	82	71
	Texas West	67	79	79	75	79	72	67
	Texas Mean	68	79	81	78	82	75	68
	Regional Mean	72	83	83	82	85	79	72
1998	Bay City, TX	81	87	84	87	81	82	85
	Beaumont, TX	73	84	86	79	89	82	79
	Eagle Lake, TX	73	78	77	77	81	76	73
	Ganado, TX	69	72	71	73	76	69	69
	Stuttgart, AR	75	84	85	78	86	84	71
	Stoneville, MS	71	75	74	74	79	76	67
	Crowley, LA	88	101	101	-	-	100	97
	Texas East	73	84	86	79	89	82	79
	Texas West	74	79	77	79	83	76	76
	Texas Mean	74	80	80	79	84	77	77
	Regional Mean	76	83	83	78	84	81	77
1999	Bay City, TX	71	80	79	80	81	82	71
	Beaumont, TX	79	86	87	86	87	86	81
	Eagle Lake, TX	78	88	85	84	87	86	74
	Ganado, TX	66	75	71	71	74	75	62
	Stuttgart, AR	85	88	88	90	88	86	81
	Stoneville, MS	72	76	77	73	78	77	67
	Crowley, LA	68	73	77	72	76	74	68
	Texas East	79	86	87	86	87	86	81
	Texas West	72	81	78	78	81	81	69
	Texas Mean	74	82	81	80	82	82	72
	Regional Mean	74	81	81	79	82	81	72
2000	Bay City, TX	69	76	75	73	-	74	69
	Beaumont, TX	69	77	77	78	-	77	69
	Eagle Lake, TX	63	73	73	72	-	72	63
	Ganado, TX	65	71	73	73	-	74	68
	Bay City, TX	66	77	75	73	77	71	67
	Beaumont, TX	73	81	83	82	85	81	74
	Eagle Lake, TX	77	81	84	84	88	82	77
	Ganado, TX	65	72	72	72	72	72	67
	Stuttgart, AR	78	87	84	89	89	82	77
	Stoneville, MS	80	84	86	86	89	84	78
	Crowley, LA	83	90	90	87	90	87	88
	Malden, MO	94	94	90	93	97	92	89
	Texas East	71	79	80	80	85	79	72
	Texas West	68	75	75	75	79	74	69
	Texas Mean	68	76	77	76	81	75	69
	Regional Mean	74	80	80	80	86	79	74
	GRAND Texas East	73	82	83	82	86	81	75
	GRAND Texas West	72	79	79	78	82	77	71
	GRAND Texas Mean	72	80	80	79	83	78	72
	GRAND Regional Mean	75	82	82	81	85	81	75

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**U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY  
PLANT VARIETY PROTECTION OFFICE  
BELTSVILLE, MD 20705**

## **Exhibit C**

## **OBJECTIVE DESCRIPTION OF VARIETY**

### **Rice (*Oryza sativa*)**

NAME OF APPLICANT (S)	Anna Myers McClung	FOR OFFICIAL USE ONLY
ADDRESS (Street and No. or RD No., City, State, and Zip Code)	PVP NUMBER 200-200095	
USDA-ARS 1509 Aggie Dr. Beaumont, TX 77713	VARIETY NAME Bolivar	TEMPORARY OR EXPERIMENTAL DESIGNATION TX 5012

**PLEASE READ ALL INSTRUCTIONS CAREFULLY:**

Place the appropriate number that describes the character of this variety in the spaces provided below. These numbers are also code numbers corresponding to descriptors developed by IBGR-IRRI Rice Advisory Committee and the US Rice Crop Advisory Committee. Breeders will demonstrate distinctness more readily by describing as many characters as is possible.

**1. MATURITY - Days to Heading (Seeding to 50% Heading):**

- A. South: (Location: Beaumont, TX) at 180 kg/ha (Nitrogen Rate)

15 Number of Days

7 Days Earlier Than Check Variety: Dixie belle

Days Same As      Check Variety: \_\_\_\_\_

2 Days Later Than Check Variety: Jefferson

- B. California: (Location: \_\_\_\_\_) at \_\_\_\_\_ kg/ha (Nitrogen Rate)

Number of Days

Days Earlier Than      Check Variety: \_\_\_\_\_

Days Same As      Check Variety: \_\_\_\_\_

Days Later Than      Check Variety: \_\_\_\_\_

Maturity Class (50% Heading) – California:

## **2. CULM:**

- 1 Angle (Degrees from Perpendicular after Flowering):  
1 = Erect (Less than 30°)      3 = Intermediate (About 45°)      5 = Open (About 60°)  
7 = Spreading (More than 60° but the culms do not rest on the ground)  
9 = Procumbent (The culm or its lower part rests on the ground surface)

## 2. CULM: (continued)

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## LENGTH

9 6 • 0 cm (Soil level to top of extended panicle on main stem)1 • 0 cm Shorter Than Check Variety: SabreLength Same as Check Variety: Cypress1 0 • 0 cm Longer Than Check Variety: Dixiebelle1 Height Class: 1 = Semi dwarf    2 = Short    3 = Medium    4 = Tall2 Internode Color (After Flowering): 1 = Green    2 = Light Gold    3 = Purple Lines    4 = Purple1 Strength (Lodging Resistance): 1 = Strong (no Lodging)    3 = Moderately Strong (Most Plants Leaning)  
5 = Intermediate (Most Plants Lodged)    7 = Weak (Most Plants Flat)  
9 = Very Weak (All Plants Flat)

## 3. FLAG LEAF (After Heading):

3 4 • 1 cm Length1 5 • 5 mm Width1 Pubescence: 1 = Glabrous    2 = Intermediate    3 = Pubescent1 Leaf Angle (After Heading): 1 = Erect    3 = Intermediate    5 = Horizontal    7 = Descending2 Blade Color: 1 = Pale Green    2 = Green    3 = Dark Green    4 = Purple Tips  
5 = Purple Margins    6 = Purple Blotch    7 = Purple1 Basal Leaf Sheath Color: 1 = Green    2 = Purple Lines    3 = Light Purple    4 = Purple

## 4. LIGULE:

2 • 0 mm Length (From base of collar to the tip, at late vegetative stage)1 Color (Late Vegetative Stage): 1 = White    2 = Purple Lines    3 = Purple2 Shape: 1 = Acute to Acuminate    2 = 2-Cleft    3 = Truncate1 Collar Color (Late Vegetative Stage): 1 = Pale Green    2 = Green    3 = Purple1 Auricle Color (Late Vegetative Stage): 1 = Pale Green    2 = Purple

## 5. PANICLE:

2 1 • 3 cm Length1 Type: 1 = Compact    5 = Intermediate    9 = Open2 Secondary Branching: 1 = Absent    2 = Light    3 = Heavy    4 = Clustering3 Exsertion (Near Maturity): 1 = Less than 90%    2 = 90 - 99%    3 = 100% Exserted2 Axis: 1 = Straight    2 = Droopy1 Shattering: 1 = Very Low (Less Than 1%)    3 = Low (1 - 5%)    5 = Moderate (6 - 25%)  
7 = Moderately High (26 - 50%)    9 = High (More than 50%)2 Threshability: 1 = Difficult    2 = Intermediate    3 = Easy

## 6. GRAIN (Spikelet):

0 Awns (After Full Heading): 0 = Absent    1 = Short and Partly Awned    5 = Short and Fully Awned  
7 = Long and Partly Awned    9 = Long and Fully Awned3 Apiculus Color (At Maturity): 1 = White    2 = Straw    3 = Brown (Tawny)    4 = Red  
5 = Red Apex    6 = Purple    7 = Purple Apex1 Stigma Color: 1 = White    2 = Light Green    3 = Yellow    4 = Light Purple    5 = Purple

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## 6. GRAIN (Spikelet):

4 Lemma and Palea Color (At Maturity):

0 = Straw  
3 = Brown Furrows on Straw  
6 = Purple Spots on Straw  
9 = Black

1 = Gold and/or Gold Furrows on Straw Background  
4 = Brown (Tawny)  
7 = Purple Furrows on Straw  
10 = White

2 = Brown Spots on Straw (Piebald)  
5 = Reddish to Light Purple  
8 = Purple

1 Lemma and Palea Pubescence:

1 = Glabrous      2 = Hairs on Lemma Keel      3 = Hairs on Upper Portion  
4 = Short Hairs    5 = Long Hairs (Velvety)

1 Spikelet Sterility (At Maturity):

1 = Highly Fertile (> 90%)    3 = Fertile (75 - 90%)    5 = Partly Sterile (50 - 74%)  
7 = Highly Sterile (< 50% to Trace)    9 = Completely Sterile (0%)

## 7. GRAIN (Seed):

2 Seed Coat (Bran) Color:

1 = White	2 = Light Brown	3 = Speckled Brown	4 = Brown
5 = Red	6 = Variable Purple	7 = Purple	

1 Endosperm Type:

1 = Nonglutinous (Nonwaxy)	2 = Glutinous (Waxy)	3 = Indeterminate
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1 Endosperm Translucency:

1 = Clear	5 = Intermediate	9 = Opaque
-----------	------------------	------------

1 Endosperm Chalkiness:

0 = None	1 = Small (Less than 10% of Sample)
5 = Medium (10 - 20% of Sample)	9 = Large (More than 20% of Sample)

0 Scent (Aroma):

0 = Nonscented	1 = Lightly Scented	2 = Scented
----------------	---------------------	-------------

Shape Class (Length/Width Ratio):

3 Paddy      1 = Short (2.2:1 and Less)    2 = Medium (2.3:1 to 3.3:1)    3 = Long (3.4:1 and More)3 Brown      1 = Short (2.0:1 and Less)    2 = Medium (2.1:1 to 3.0:1)    3 = Long (3.1:1 and More)3 Milled      1 = Short (1.9:1 and Less)    2 = Medium (2.0:1 to 2.9:1)    3 = Long (3.0:1 and More)

Measurements:

Grain Form	Length (mm)	Width (mm)	Thickness (mm)	LW Ratio	1000 Grains (grams)
Paddy	9.08	2.70	1.95	3.36	24.66
Brown	6.95	2.35	1.74	2.96	19.73
Milled	6.53	2.32	1.65	2.81	17.65

Milling Quality (% Hulls)

54 Milling Yield (% Whole Kernel (head) Rice to Rough Rice)16 % Protein

25 % Amylose

Alkali Spreading Value: 4 1.5% KOH Solution      1.7% KOH Solution5 Gelatination Temperature Type:

1 = High	5 = Intermediate	7 = Low
----------	------------------	---------

Amylographic Paste Viscosity (Brabender Units)

Peak	Hot Paste	Cooled Paste	'Breakdown' 'Setback'
259	191	363	68 104

## 8. RESISTANCE TO LOW TEMPERATURE:

1 Germination and Seedling Vigor:

1 = Low	2 = Medium	3 = High
---------	------------	----------

1 Flowering (Spikelet Fertility):

1 = Low	2 = Medium	3 = High
---------	------------	----------

## 9. SEEDLING VIGOR NOT RELATED TO LOW TEMPERATURE:

2 Vigor:

1 = Low	2 = Medium	3 = High
---------	------------	----------

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10. BLAST RESISTANCE: (*Pyricularia oryzae*). (International races found under References)

	0 = Immune	1 = Resistant	3 = Moderately Resistant	5 = Intermediate	7 = Moderately Susceptible	9 = Susceptible							
Group	IB	IC	ID	IE	IG	IH							
Number	1	5	45	49	54	1	17	1	13	1	1	1	1
Resistance	1	—	1	1	1	—	1	—	—	1	1	1	1

## 11. RESISTANCE TO OTHER DISEASES:

0 = Immune	1 = Resistant	3 = Moderately Resistant	5 = Intermediate	7 = Moderately Susceptible	9 = Susceptible
<u>1</u> Narrow Brown Leaf Spot ( <i>Cerospora oryzae</i> )				<u>—</u> Aggregate Sheath Spot ( <i>Rhizoctonia Oryzae-sativae</i> )	
<u>3</u> Leaf Smut ( <i>Entyloma oryzae</i> )				<u>3</u> Straight Head	
<u>3</u> Brown Leaf Spot ( <i>Helminthosporium oryzae</i> ) (= <i>Bipolaris oryzae</i> ) (= <i>Drechslera oryzae</i> )				<u>3</u> Kernel Smut ( <i>Neovossia horrida</i> ) (= <i>Tilletia barclayana</i> )	
<u>—</u> Leaf Scald ( <i>Gerlachia oryzae</i> )				<u>—</u> White Tip Nematode ( <i>Aphelenchoides besseyi</i> )	
<u>—</u> Hoja Blanca Virus				<u>—</u> Stem Rot ( <i>Sclerotium oryzae</i> )	
<u>—</u> Sheath Rot ( <i>Sarocladium oryzae</i> )				<u>—</u> Bacterial Blight ( <i>Xanthomonas campestris</i> pv. <i>oryzae</i> )	
<u>—</u> Pythium Seedling Blight ( <i>Pythium</i> sp.)				<u>7</u> Sheath Blight ( <i>Rhizoctonia solani</i> )	
<u>—</u> Sheath Spot ( <i>Rhizoctonia oryzae</i> )					
<u>—</u> Other: _____					

## 12. INSECT RESISTANCE:

0 = Immune	1 = Resistant	3 = Moderately Resistant	5 = Intermediate	7 = Moderately Susceptible	9 = Susceptible
<u>—</u> Grasshopper				<u>3</u> Rice Stink Bug ( <i>Oegalus pugnax</i> )	
<u>—</u> Rice Leafhopper				<u>—</u> Swarm Caterpillar	
<u>—</u> Rice Hispa				<u>3</u> Rice Water Weevil ( <i>Lissorhoptrus oryzophilus</i> )	
<u>—</u> Rice Midge				<u>9</u> Rice Stalk Borer ( <i>Chilo plejadellus</i> )	
<u>—</u> Least Skipper				<u>9</u> Sugarcane Borer ( <i>Diatraea saccharalis</i> )	

## 13. OTHER DESCRIPTORS: If there are other characters that describe this variety, please indicate below:

## REFERENCES

- C. R. Adair et al. 1972. Rice in the United States: Varieties and Production. USDA Handbook No. 289 (Rev.), 124 pp.
- J. G. Atkins et al. 1967. An International Set of Rice Varieties for Differentiating Race of *Pyricularia Oryzae*. Phytopath. 57:297-301.
- IBPGR-IRRI Rice Advisory Committee. 1980. Descriptors for Rice *Oryza sativa* L. International Rice Research Institute. 21 pp.
- K. C. Ling and S. H. Ou, 1969. Standardization of the International Race Numbers of *Pyricularia Oryzae*. Phytopath. 59:339-342.
- B. D. Webb et al. 1985. Utilization Characteristics and Qualities of United States Rice. In Proceedings on Rice Grain Quality and Marketing. International Rice Research Institute (IRRI), Los Baños, Philippines. P. 25-35.

**Exhibit D. ADDITIONAL DESCRIPTION OF VARIETY****BOTANICAL DESCRIPTION**

Bolivar possesses a semidwarf plant type that is similar to Cypress in height (95 cm = 37 in) and is 8 centimeters (3 inches) taller than Dixiebelle (Table 1). All plant parts are glabrous (smooth). In 25 Texas trials, the average flowering date of Bolivar was the same as Jefferson and about a week earlier than Gulfmont, Dixiebelle and Cypress (Table 2). Although days to harvest is dependent on cultural management methods and environmental factors, Bolivar can be harvested in Texas in approximately 107 days as compared to 108 days for Jefferson, 111 days for Dixiebelle, 112 days for Gulfmont and 117 days for Cypress (Table 3). At maturity, the spikelet is tawny-colored and awnless. At heading the apiculus is green and then fades to straw color by maturity. The flag leaf is erect at maturity. Seedling vigor is similar to Gulfmont and treatment of seeds with gibberellic acid may enhance stand establishment.

**YIELD PERFORMANCE**

In 41 statewide and regional tests across the southern U.S. (AR, TX, LA, MS, and MO) during 1996-2000, the average (multi-state) grain yield of Bolivar was 6309 lb/ac versus 6840 lb/ac for Gulfmont, 6651 lb/ac for Dixiebelle, and 7182 lb/ac for Cypress (Table 4). This indicates that Bolivar is well adapted across the southern U.S. rice growing area but is not superior in main crop yield potential as compared to other commercial cultivars. In the 25 trials that were conducted in Texas during this period, Bolivar produced yields that were within 8% of that of Dixiebelle (Table 4). In trials conducted in Texas and at Crowley, LA during 1996-2000, the ratoon yield of Bolivar (2881 lb/ac) was better than Jefferson (2608 lb/ac), Gulfmont (2446 lb/ac), Dixiebelle (2356 lb/ac) and Cypress (2119 lb/ac) (Table 5). This demonstrates that Bolivar has first and second crop yield potential that is competitive with current commercial cultivars across the southern U.S.

**MILLING QUALITY**

Bolivar does not have as high a head rice milling quality as many of the current commercial cultivars (Table 6) but its total milling yield was the same as Gulfmont and Cypress (Table 7). Whole milling yield (head rice) is less important than total milling yield for rice that is targeted for the parboiling and canning industries as compared to rice that will be used primarily for the white rice market. A comparison of grain dimensions and kernel weight of Bolivar, Dixiebelle and Gulfmont shows that Bolivar has grain dimensions and weight very similar to Gulfmont and considerably larger than Dixiebelle (Table 8). The larger grain size is considered desirable in some packaged products.

**DISEASE REACTIONS**

Bolivar has excellent resistance to all of the races of blast disease (*Pyricularia grisea*) that occur in the United States (Table 9). In contrast, Dixiebelle, has high levels of resistance to only one major race of blast (IH-1) in the U.S. (McClung, et al. 1998. *Crop Sci.* 38:898) and is believed to possess only the *Pi-i* major gene for resistance (Marchetti, M.A. 1994. *In Rice Blast Disease*. 1994. CAB Internat., Cambridge, UK. pp. 231-244.). Based upon race reactions and pedigree, it is speculated that Bolivar possesses the *pi-d*, *Pi-k<sup>h</sup>*, and *Pi-b* major genes for blast resistance. It is likely that the *pi-d* and *Pi-k<sup>h</sup>* genes may have been inherited from the Gulfmont parent which possesses these two genes (Bollich, et al. 1990. *Crop Sci.* 30:1159-1160) as does the cultivar, Lemont (Marchetti, M.A. 1994. *In Rice Blast Disease*. 1994. CAB Internat., Cambridge, UK. pp. 231-244.). Although the genetic basis for blast resistance in Teqing, a cultivar from China, is not clearly known, it has demonstrated high levels of resistance to all of the races of blast that are known to occur in the U.S. (Marchetti, pers. comm.). Teqing has been reported to possess a number of resistance genes; one of which is near the region where the *Pi-b* gene has been mapped (Tabien, et al. 2000. *Theor. Appl. Genet.* 101:1215-1225). DNA analysis using a marker based on sequence information from the cloned *Pi-b* gene (Wang, et al. 1999. *Plant J.* 19:55-66), a molecular marker that is on top of the gene (RM 208) and molecular markers

which flank the gene (RM 166 and RM 266) (Fjellstrom, et al. 2002, 2004) indicates that this region of chromosome 2 is similar in Bolivar to that found in Teqing (Figure 1.). Both Saber, which was the first U.S. cultivar reported to possess the *Pi-b* resistance gene (ARS release notice), and Bolivar appear to have inherited the *Pi-b* gene from their Teqing parent. The blast resistance of Bolivar is far superior to that of Dixiebelle, Gulftmont, and Cypress and is comparable to other blast resistant U.S. cultivars like Jefferson and Saber (Tables 9 and 10). The highly resistant reaction of Bolivar in nursery screenings against a mixture of the predominant U.S. races of blast also supports the conclusion that it has both major and minor (partial) gene resistance for blast disease (Table 10) which is likely adequate to preclude the use of fungicides for the control of this disease in most situations.

Over 5 years and 14 screening nurseries inoculated with the organism that causes sheath blight, (*Rhizoctonia solani*), Bolivar has demonstrated improved levels of resistance as compared to Gulftmont, Cypress, and Dixiebelle (Table 11). In a five-year study conducted at Beaumont, yield losses due to sheath blight were observed to be lower for Bolivar (9.8%) as compared to Lemont (19.1%), Cypress (20.8%), and Madison (20.7%) although the disease severity (disease index) was similar.

Screening results for reaction to narrow brown leaf spot [*Cercospora janseana* (Racib) O.] indicate Bolivar is highly resistant (Table 13). Bolivar also appears to have good levels of tolerance to the physiological disorder, straighthead, like many other southern rice cultivars (Table 14). Although opportunities for screening for brown spot [*Bipolaris oryzae* (B. de Haan) Ellis], leaf smut [*Entyloma oryzae* H. & D. Sydow], and panicle blight have been limited, Bolivar, like most of the other recent releases from the Texas program, appears to have good levels of resistance to these diseases (data not shown). Thus, Bolivar is an early maturing, semidwarf cultivar that has high levels of resistance to the most common diseases that are found in the southern U.S. rice-growing region.

#### **COOKING QUALITY**

The endosperm of Bolivar is nonglutinous, nonaromatic, and is covered by a light brown pericarp. Although Bolivar can be used by the milling industry like any other conventional long grain rice, it also possesses superior processing quality (parboiling and canning) like Dixiebelle. Both of these cultivars possess a different allele (i.e. form) of the waxy gene that controls the amount of amylose that is produced in the grain. Thus, Bolivar and Dixiebelle have 2-3% higher amylose contents (ca. 25%) than most conventional U.S. long-grain cultivars. The presence of this allele results in significantly higher amylographic viscosities (hot paste and cool paste) and results in lower starch solids loss and better grain integrity during processing. Molecular markers for the waxy gene have been used to demonstrate that the source of this value-added processing quality in Bolivar is its parent Teqing (data not shown) (Ayres et al. 1997). Like Dixiebelle, Bolivar has an intermediate gelatinization temperature (70-75 °C) as indicated by alkali-spreading values of 3 to 5 in 1.7% KOH solution.

#### **REFERENCES**

- Ayers, McClung, Larkin, Bligh, Jones, and Park. 1997. Microsatellites and a single nucleotide polymorphism differentiate apparent amylose classes in an extended pedigree of US rice germplasm. *Theoretical and Applied Genetics*. 94:773-781.
- Fjellstrom, McClung, Shank, Marchetti, Bormans, and Park. 2002. Progress on development of microsatellite markers associated with rice blast resistance genes. P.43-44. In Proc. 29<sup>th</sup> Rice Technical Working Group Mtg. Texas Agric. Expt. Stn. College Station, TX.
- Fjellstrom, Conaway-Bormans, McClung, Marchetti, Shank, and Park. 2004. Development of DNA markers suitable for marker assisted selection of three *Pi* genes conferring resistance to multiple *Pyricularia grisea* pathotypes.

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Table 9. Comparison for reaction to blast\* (*Pyricularia grisea*) in inoculated greenhouse tests conducted at Beaumont, Tx (1996 - 2000).

Blast Race/Pathotype

Year	Cultivar	IB-1	IB-1	IB-1J	IB-1J	IB-77	IB-45	IB-45	IB-49	IB-49	IB-54	IC-17	IC-17	IE-1	IE-1	IE-1K	IE-1K	IG-1	IG-1	IH-1	IH-1
96	Jefferson	4	3				1	1	5	4	1	0	0	1	1	0	0	1	1	0	0
96	Gulfmont	3	3				1	1	1,6	1,4	1	1	3	5	6	6	5	4	1	1	1
96	Madison	0	0				2	0	1	1	1	1	1	1	1	1	4	3	1	1	0
96	Kaybonnet	0	0				1	1	1	0	1	1	1	1	1	1	1	1	1	1	0
96	Cypress	1	1				1	1	1	1	1	1	2	3	2	4	2	2	1	1	0
96	Saber	1	1				1	1	1	1	1	1	1	1	1	1	0	0	1	1	0
96	Dixiebelle	2	2				2	2	4	3	2	4	2	4	3	3	3	1	2	0	0
96	BOLIVAR	1	1				1	1	1	1	1	1	2	1	1	0	0	0	1	0	0
97	Jefferson	2	1				1	1	6	4	1	1	1	2	1	1	1	1	1	1	1
97	Gulfmont	3	1				1	1	0	3	1	1	1	5	6	6	6	4	4	1	2
97	Madison	1	1				1	1	1	1	1	1	1	1	1	1	1	4	1	1	1
97	Kaybonnet	1	1				1	1	1	1	1	1	1	2	1	1	1	5	4	1	1
97	Cypress	2	1				1	1	0	3	1	1	2	4	6	6	4	2	1	1	1
97	Saber	1	1				1	1	1	2	3	1	1	2	1	1	1	1	1	1	1
97	Dixiebelle	3	3				1	1	1	5	3	4	2	1	4	6	3	4	4	4	1
97	BOLIVAR	5	1				1	1	3	4	1	4	1	1	1	1	1	1	1	1	1
98	Jefferson	2	1	6	6				6	5	0	0	1	1	2	1	1	1	1	1	1
98	Gulfmont	3	0	5	5				7	8	0	0	5	6	6	6	4	4	1	2	1
98	Madison	1	1	1	2				1	1	0	0	1	3	4	1	1	4	1	1	1
98	Kaybonnet	1	0	1	1				1	1	0	0	0	3	2	4	4	4	1	4	1
98	Cypress	1	3	7	7				4	6	0	0	5	8	4	4	5	1	1	1	1
98	Saber	0	1	1	1				24	27	0	0	2	1	1	1	1	1	1	1	1
98	Dixiebelle	4	4	4	4				4	5	6	4	6	7	4	4	4	3	1	2	1
98	BOLIVAR	0	0	1	1				4	2	0	0	1	1	3	1	1	1	1	1	1
99	Jefferson	5	6	4	1				8	0	0	1	1	1	1	1	1	1	1	1	1
99	Gulfmont	5	5	6	1				7	0	0	5	6	6	4	4	4	4	4	4	1
99	Madison	1	1	1	2				1	0	0	1	5	4	4	4	4	4	4	1	1
99	Kaybonnet	4	1	1	1				3	0	0	1	4	4	4	4	4	4	1	1	1
99	Cypress	5	6	6	1				7	0	0	5	4	4	4	4	4	4	1	1	1
99	Saber	3	2	3	3				4	0	0	3	1	1	2	1	1	2	1	1	1
99	Dixiebelle	4	3	5	4				6	7	5	4	4	4	4	4	4	4	4	2	1
99	BOLIVAR	1	1	2	4				6	0	2	1	1	1	1	1	1	1	1	1	1
00	Jefferson	4	1	1	1				6	0	0	1	1	1	1	1	1	1	1	1	1
00	Gulfmont	4	4	4	1				6	1	0	4	4	4	4	4	4	4	4	1	1
00	Madison	0	0	0	2				1	0	0	1	3	8	8	8	8	8	8	1	1
00	Kaybonnet	1	2	5	5				8	1	1	3	1	1	1	1	1	4	4	1	1
00	Cypress	4	5	5	5				5	1	0	0	0	0	0	0	0	0	0	1	1
00	Saber	1	1	1	1				4	1	1	1	1	1	1	1	1	1	1	1	1
00	Dixiebelle	3	4	4	4				4	6	4	4	4	4	4	4	4	4	4	2	1
00	BOLIVAR	1	1	1	1				3	1	1	1	1	1	1	1	1	1	1	1	1

\* Using a scale of 0=no lesions to 8=large water soaked lesions without well-defined borders

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Table 10. Comparison for reaction to blast\* (*Pyricularia grisea*) in inoculated field plots located at Beaumont, Tx (1996 - 2000).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolívar
96	2	6	1	5	1	1	4	1
97	4	4	4	4	1	1	5	1
98	4	6	1	6	1	1	7	1
99	1	3	1	4	2	1	6	1
99	2	4	1	1	1	1	6	1
00	5	5	1	5	1	3	6	6
00	4	5	2	5	1	3	5	4
Mean	3	5	2	4	1	2	6	2

\* Using a scale where 1= very resistant to 9=very susceptible.

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Figure 1. Marker based on DNA sequence of cloned *Pi-b* gene (A), microsatellite marker closed linked to *Pi-b* gene (B), and flanking microsatellite markers (C,D) demonstrate that Boliver, Teqing, and Saber have similar genetic makeup at the *Pi-b* locus on rice chromosome 2.

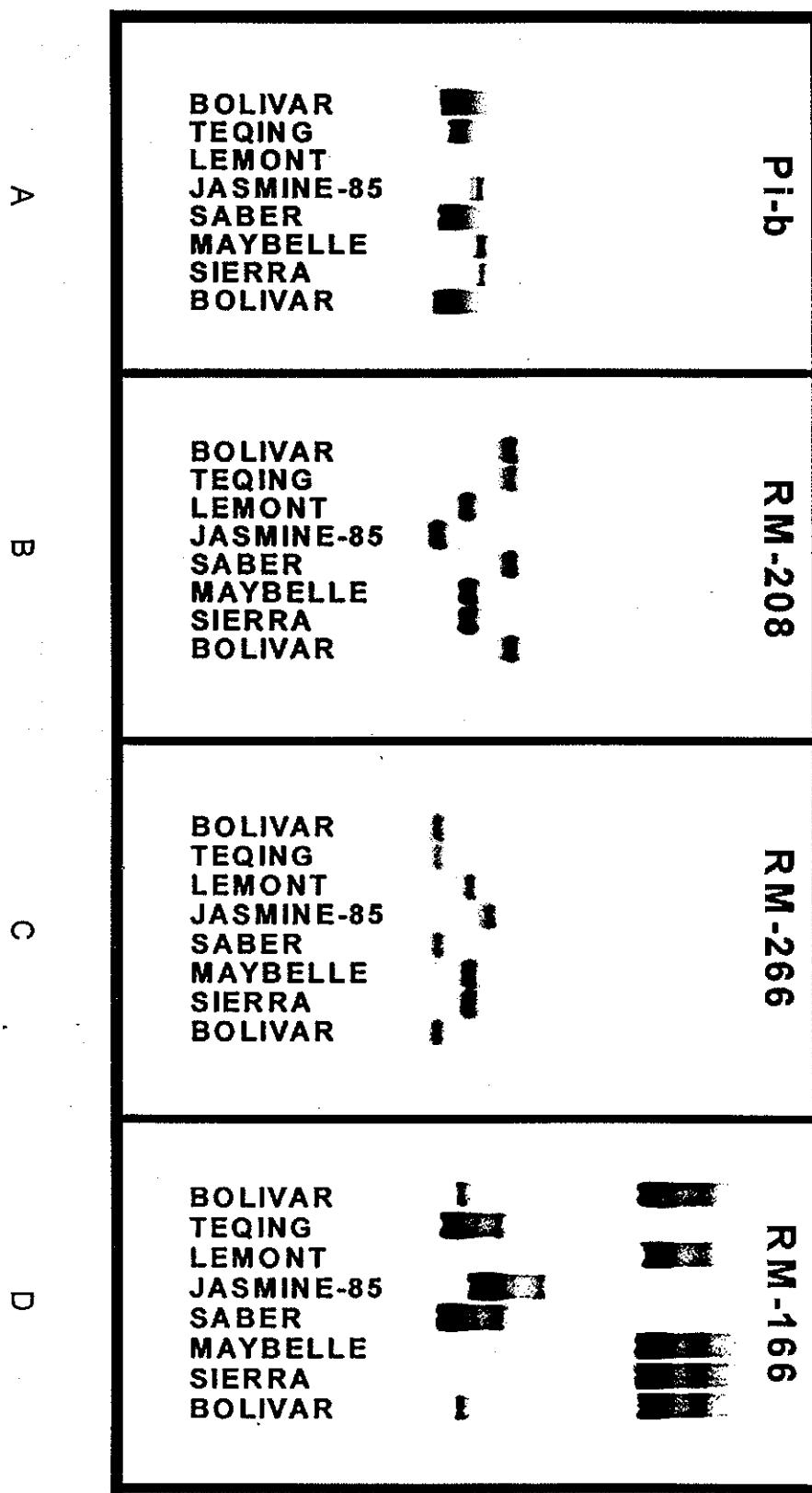


Table 1. Mean plant height (cm) of Bolivar and selected check varieties at several Texas locations and in Louisiana, Arkansas, Missouri and Mississippi (1996-2000).

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Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Bay City, TX	96	84	87	82	81	100	100
	Beaumont, TX	98	99	103	88	91	98	101
	EI Campo, TX	87	91	88	85	84	94	92
	Eagle Lake, TX	101	96	98	91	88	99	99
	Ganado, TX	113	94	85	88	86	99	93
	Stuttgart, AR	98	100	103	93	90	92	100
	Crowley, LA	95	90	85	88	85	83	103
	Stoneville, MS	90	103	105	93	98	90	96
	Texas East	98	99	103	88	91	98	101
	Texas West	99	94	95	89	87	98	96
	Texas Mean	99	95	96	89	88	98	97
	Regional Mean	97	96	98	90	89	94	98
1997	Beaumont, TX	79	87	91	82	81	92	88
	EI Campo, TX	78	90	97	87	86	97	90
	Eagle Lake, TX	90	93	90	86	85	96	86
	Ganado, TX	81	91	97	82	84	92	85
	Stuttgart, AR	96	93	89	90	87	100	95
	Stoneville, MS	89	90	93	83	86	103	83
	Crowley, LA	91	97	102	91	91	98	95
	Texas East	79	87	91	82	81	92	86
	Texas West	83	91	95	85	85	95	90
	Texas Mean	82	90	94	84	84	94	90
	Regional Mean	86	92	96	86	86	97	92
1998	Bay City, TX	92	98	99	95	96	101	99
	Beaumont, TX	104	100	106	91	84	105	99
	Eagle Lake, TX	83	87	85	82	85	83	87
	Ganado, TX	87	88	92	86	86	90	95
	Stuttgart, AR	98	91	98	80	86	98	100
	Stoneville, MS	106	103	10	86	93	111	100
	Crowley, LA	93	88	88	81	91	98	93
	Texas East	104	100	106	91	94	105	99
	Texas West	87	91	92	88	89	91	84
	Texas Mean	92	93	96	89	90	95	95
	Regional Mean	95	94	83	86	90	98	96
1999	Bay City, TX	95	101	103	87	89	104	98
	Beaumont, TX	88	86	88	82	79	90	90
	Eagle Lake, TX	87	93	96	97	95	100	84
	Ganado, TX	96	93	104	87	87	102	82
	Stuttgart, AR	95	88	95	86	78	100	96
	Stoneville, MS	90	93	102	86	85	103	83
	Crowley, LA	90	93	99	85	88	98	94
	Texas East	88	86	88	82	79	90	90
	Texas West	93	86	101	90	90	102	95
	Texas Mean	92	93	98	88	88	99	94
	Regional Mean	92	92	98	87	86	100	94
2000	Bay City, TX	91	93	85	89	-	89	97
	Beaumont, TX	104	99	99	93	-	106	101
	Eagle Lake, TX	88	83	86	81	-	89	90
	Ganado, TX	84	88	93	79	-	92	86
	Bay City, TX	95	93	103	87	89	104	98
	Beaumont, TX	88	84	88	82	79	90	101
	Eagle Lake, TX	87	95	96	97	95	100	89
	Ganado, TX	96	91	104	87	87	102	93
	Stuttgart, AR	97	92	92	89	86	96	98
	Stoneville, MS	91	88	99	87	87	101	85
	Crowley, LA	95	97	97	90	95	100	96
	Malden, MO	83	88	86	85	79	93	85
	Texas East	96	92	94	88	79	98	101
	Texas West	90	91	96	87	90	98	92
	Texas Mean	92	91	96	87	88	98	94
	Regional Mean	92	91	95	87	87	98	93
	GRAND Texas East	93	93	96	86	85	97	96
	GRAND Texas West	90	92	96	88	88	97	93
	GRAND Texas Mean	91	92	96	87	87	97	94
	GRAND Regional Mean	92	93	94	87	88	97	95

Table 2. Mean number of days to 50% heading for Bolivar and selected check varieties  
at several Texas locations and in Louisiana, Arkansas, Missouri and Mississippi (1996-2000).

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Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Bay City, TX	76	85	85	84	87	81	76
	Beaumont, TX	74	78	80	79	79	77	74
	El Campo, TX	84	91	93	94	96	93	85
	Eagle Lake, TX	73	78	79	79	83	78	71
	Ganado, TX	75	81	80	81	85	81	74
	Stuttgart, AR	78	84	84	87	89	81	75
	Crowley, LA	92	96	95	96	102	95	93
	Stoneville, MS	72	79	81	81	86	78	72
	Texas East	74	78	80	79	79	77	74
	Texas West	77	84	84	85	88	83	77
	Texas Mean	76	83	83	83	86	82	76
	Regional Mean	78	84	85	85	88	83	78
1997	Beaumont, TX	70	81	84	85	89	82	71
	El Campo, TX	69	81	81	77	86	73	72
	Eagle Lake, TX	71	81	81	80	83	76	70
	Ganado, TX	61	74	76	68	69	68	60
	Stuttgart, AR	75	85	85	84	89	83	72
	Stoneville, MS	73	83	83	79	85	82	73
	Crowley, LA	85	94	91	99	94	90	86
	Texas East	70	81	84	85	89	82	71
	Texas West	67	79	79	75	79	72	67
	Texas Mean	68	79	81	78	82	75	68
	Regional Mean	72	83	83	82	85	79	72
1998	Bay City, TX	81	87	84	87	91	82	85
	Beaumont, TX	73	84	86	79	89	82	79
	Eagle Lake, TX	73	78	77	77	81	76	73
	Ganado, TX	69	72	71	73	76	69	69
	Stuttgart, AR	75	84	85	78	86	84	71
	Stoneville, MS	71	75	74	74	79	76	67
	Crowley, LA	88	101	101	-	-	100	97
	Texas East	73	84	86	79	89	82	79
	Texas West	74	79	77	79	83	76	76
	Texas Mean	74	80	80	79	84	77	77
	Regional Mean	76	83	83	78	84	81	77
1999	Bay City, TX	71	80	79	80	81	82	71
	Beaumont, TX	79	86	87	86	87	86	81
	Eagle Lake, TX	78	88	85	84	87	86	74
	Ganado, TX	66	75	71	71	74	75	62
	Stuttgart, AR	85	88	88	90	88	86	81
	Stoneville, MS	72	76	77	73	78	77	67
	Crowley, LA	68	73	77	72	76	74	68
	Texas East	79	86	87	86	87	86	81
	Texas West	72	81	78	78	81	81	69
	Texas Mean	74	82	81	80	82	82	72
	Regional Mean	74	81	81	79	82	81	72
2000	Bay City, TX	69	76	75	73	-	74	69
	Beaumont, TX	69	77	77	78	-	77	69
	Eagle Lake, TX	63	73	73	72	-	72	63
	Ganado, TX	65	71	73	73	-	74	68
	Bay City, TX	66	77	75	73	77	71	67
	Beaumont, TX	73	81	83	82	85	81	74
	Eagle Lake, TX	77	81	84	84	88	82	77
	Ganado, TX	65	72	72	72	72	72	67
	Stuttgart, AR	78	87	84	89	89	82	77
	Stoneville, MS	80	84	86	86	89	84	78
	Crowley, LA	83	90	90	87	90	87	88
	Malden, MO	94	94	90	93	97	92	89
	Texas East	71	79	80	80	85	79	72
	Texas West	68	75	75	75	79	74	69
	Texas Mean	68	76	77	76	81	75	69
	Regional Mean	74	80	80	80	86	79	74
	GRAND Texas East	73	82	83	82	86	81	75
	GRAND Texas West	72	79	79	78	82	77	71
	GRAND Texas Mean	72	80	80	79	83	78	72
	GRAND Regional Mean	75	82	82	81	85	81	75

**Table 3. Mean number of days to harvest for Bolivar and selected check varieties at several Texas locations and in Mississippi during 1996-2000.**

Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Bay City, TX	124	123	126	122	123	123	122
	Beaumont, TX	107	113	114	114	112	112	107
	El Campo, TX	114	118	131	116	130	131	116
	Eagle Lake, TX	109	115	123	115	122	117	107
	Ganado, TX	113	117	122	117	118	117	111
	Stoneville, MS	109	113	131	122	123	141	109
	Texas East	107	113	114	114	112	112	107
	Texas West	115	118	126	118	123	122	114
	Texas Mean	113	117	123	117	121	120	113
	Regional Mean	113	117	125	118	121	124	112
1997	Beaumont, TX	104	114	114	114	119	110	102
	El Campo, TX	103	111	118	109	116	106	104
	Eagle Lake, TX	106	110	116	107	114	106	106
	Ganado, TX	100	105	118	104	116	105	99
	Stoneville, MS	113	129	131	133	134	131	131
	Texas East	104	114	114	114	119	110	102
	Texas West	103	109	117	107	115	106	103
	Texas Mean	103	110	117	109	116	107	103
	Regional Mean	105	114	119	113	120	112	108
1998	Bay City, TX	114	115	121	117	119	113	117
	Beaumont, TX	110	117	117	114	117	117	110
	Eagle Lake, TX	106	108	114	108	111	108	102
	Ganado, TX	105	105	110	106	109	105	105
	Stoneville, MS	113	121	121	126	125	113	105
	Texas East	110	117	117	114	117	117	110
	Texas West	108	109	115	110	113	109	108
	Texas Mean	109	111	116	111	114	111	109
	Regional Mean	110	113	117	114	116	111	108
1999	Bay City, TX	108	110	111	108	108	108	106
	Beaumont, TX	111	116	120	113	118	118	110
	Eagle Lake, TX	109	114	118	115	114	114	106
	Ganado, TX	105	104	108	105	103	105	104
	Stoneville, MS	113	127	126	113	116	120	113
	Texas East	111	116	120	113	118	118	110
	Texas West	107	109	112	109	108	109	105
	Texas Mean	108	111	114	110	111	111	107
	Regional Mean	109	114	117	111	112	113	108
2000	Bay City, TX	105	106	112	105	-	107	104
	Beaumont, TX	100	108	110	106	-	112	100
	Eagle Lake, TX	107	108	109	108	-	109	106
	Ganado, TX	108	108	112	108	-	108	107
	Bay City, TX	106	113	113	105	112	105	105
	Beaumont, TX	106	113	118	111	114	113	104
	Eagle Lake, TX	106	117	120	117	120	117	110
	Ganado, TX	109	108	111	107	108	109	108
	Texas East	103	111	114	109	114	113	102
	Texas West	107	110	113	108	113	109	107
	Texas Mean	106	110	113	108	114	110	106
	Regional Mean	-	-	-	-	-	-	-
	GRAND Texas East	107	114	116	113	116	114	106
	GRAND Texas West	108	111	117	110	115	111	107
	GRAND Texas Mean	108	112	117	111	115	112	107
	GRAND Regional Mean	109	114	119	114	117	115	109

Table 4. Average main crop yield (LB/AC) for Bolivar and selected check varieties at several Texas locations and in Louisiana, Arkansas, Missouri and Mississippi (1996-2000).

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Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelie	Madison	Saber	Bolivar
1996	Bay City, TX	6678	7226	7208	7484	6941	5820	6000
	Beaumont, TX	7745	7249	8599	7012	7269	7226	7023
	El Campo, TX	6141	5015	4459	3428	6011	5207	5069
	Eagle Lake, TX	7837	7410	8061	7818	7679	7129	7474
	Ganado, TX	6833	7139	7108	7099	6658	6956	5785
	Stuttgart, AR	6577	6592	7132	5973	6454	7003	7389
	Crowley, LA	6308	6390	8036	6036	6354	6912	5339
	Stoneville, MS	7602	7894	8600	7995	7575	6431	7049
	Texas East	7745	7249	8599	7012	7269	7226	6000
	Texas West	6872	6698	6709	6457	6822	6278	6087
	Texas Mean	7047	6808	7087	6568	6911	6468	6274
	Regional Mean	6965	6864	7400	6606	6867	6586	6394
1997	Beaumont, TX	5491	6512	6557	5872	4669	6205	6089
	El Campo, TX	4927	6572	5786	5515	6630	6224	5459
	Eagle Lake, TX	6107	6285	7172	6373	6514	6379	6542
	Ganado, TX	5088	6566	6044	6189	4688	5285	4777
	Stuttgart, AR	6146	6349	6811	5979	5383	5837	6024
	Stoneville, MS	5939	6501	6783	5297	6487	7506	5888
	Crowley, LA	6517	7296	9356	6689	7194	6666	6622
	Texas East	5491	6512	6557	5872	4669	6205	6089
	Texas West	5374	6474	6334	6026	5944	5963	5593
	Texas Mean	5403	6484	6390	5987	5625	6023	5717
	Regional Mean	5745	6583	6930	5988	5938	6300	5914
1998	Bay City, TX	4368	4980	5616	5187	5159	4864	3235
	Beaumont, TX	7666	7617	6442	8502	5040	6305	6183
	Eagle Lake, TX	7462	7663	6939	7664	8032	6047	6759
	Ganado, TX	6144	6763	7372	7018	6875	5881	5801
	Stuttgart, AR	7398	7330	7710	6671	7143	7753	6797
	Stoneville, MS	6154	5595	5629	5916	5299	4299	6045
	Crowley, LA	7161	4927	5679	3514	4051	6368	4270
	Texas East	7666	7617	6442	8502	5040	6305	6183
	Texas West	5991	6469	6642	6690	6689	5597	5265
	Texas Mean	6410	6756	6592	7143	6277	5774	5495
	Regional Mean	6622	6411	6484	6362	5943	5931	5584
1999	Bay City, TX	6079	6434	6291	5862	5499	5304	5771
	Beaumont, TX	7769	7085	7806	6765	6604	7350	7107
	Eagle Lake, TX	5843	6318	6614	6894	6171	5759	5946
	Ganado, TX	6419	6188	7204	6907	6515	5583	6416
	Stuttgart, AR	6868	6862	7764	6745	7038	7526	6156
	Stoneville, MS	6362	6350	7534	6277	6533	7070	6819
	Crowley, LA	8984	8610	9650	8479	8505	8626	8525
	Texas East	7769	7085	7806	6765	6604	7350	7107
	Texas West	6114	6313	6703	6554	6062	5549	6044
	Texas Mean	6528	6506	6979	6607	6197	5999	6310
	Regional Mean	6903	6907	7552	6847	6695	6745	6534
2000	Bay City, TX	7841	7310	6180	6765	.	6267	8213
	Beaumont, TX	8729	8101	8311	8459	.	8989	8121
	Eagle Lake, TX	7560	7606	6631	6948	.	7196	5660
	Ganado, TX	7161	7545	6823	6887	.	6496	6700
	Bay City, TX	7358	6567	7256	6620	.	5948	6919
	Beaumont, TX	9359	8713	8754	8499	8861	8920	8729
	Eagle Lake, TX	7753	7265	7265	7261	.	7035	6832
	Ganado, TX	7907	7752	7368	8249	.	6416	7712
	Stuttgart, AR	7462	6570	7577	6423	8097	8142	7099
	Stoneville, MS	6951	7522	7741	7817	5239	8628	7158
	Crowley, LA	7813	6823	8076	7813	5956	7184	5167
	Malden, MO	6455	5661	5642	3456	4838	6511	7119
	Texas East	9044	8407	9033	8479	8861	8955	8425
	Texas West	7597	7341	6921	7125	.	6560	7006
	Texas Mean	7959	7607	7449	7464	8861	7158	7361
	Regional Mean	7809	7434	7544	7433	7038	7384	7119
	GRAND Texas East	7543	7374	7687	7326	6488	7208	6761
	GRAND Texas West	6390	6659	6662	6570	6379	6989	5999
	GRAND Texas Mean	6669	6832	6899	6754	6774	6204	6231
	GRAND Regional Mean	6809	6840	7182	6651	6496	6589	6309

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Table 5. Average ratoon crop yield (LB/AC) for Bolivar and selected check varieties in Texas and Louisiana (1996-2000).

Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Beaumont, TX	2119	3373	3553	3297	4134	4078	1921
	Eagle Lake, TX	3417	3035	1845	2701	1801	3218	4183
	Ganado, TX	2526	2553	2209	1682	1927	2220	2620
	Crowley, LA	3218	3002	2782	3274	3003	2830	3007
	Texas East	2119	3373	3553	3297	4134	4078	1921
	Texas West	2972	2794	2027	2192	1864	2719	3402
	Texas Mean	2323	2963	2881	2490	3031	3149	2271
	Regional Mean	2820	2991	2597	2739	2716	3087	2933
1997	Beaumont, TX	2274	1643	2452	1141	1690	2782	2406
	Eagle Lake, TX	2001	2152	1379	2398	1700	2183	3596
	Crowley, LA	3157	1918	1482	1820	2431	3443	2804
	Texas East	2274	1643	2452	1141	1690	2782	2406
	Texas West	2274	1643	2452	1141	1690	2782	2782
	Texas Mean	2138	1898	1916	1770	1695	2483	3001
	Regional Mean	2477	1904	1771	1786	1940	2803	2935
1998	Bay City, TX	474	934	701	1326	1403	1088	646
	Beaumont, TX	2885	1742	1945	1694	1661	1064	2124
	Eagle Lake, TX	1980	1511	1041	1606	1786	1446	2419
	Ganado, TX	1523	2197	2001	2392	1699	2342	1897
	Texas East	2885	1742	1945	1694	1661	1064	2124
	Texas West	1326	1547	1248	1775	1629	1625	1654
	Texas Mean	1716	1596	1422	1755	1637	1485	1772
1999	Bay City, TX	1822	2740	1967	2314	2670	1874	2335
	Beaumont, TX	4466	3000	3729	3518	3694	4573	3801
	Eagle Lake, TX	1465	1965	1825	2216	1818	2122	2820
	Ganado, TX	2294	1820	511	1902	1268	1455	1838
	Crowley, LA	2587	2691	1916	2764	2480	2772	3088
	Texas East	4466	3000	3729	3518	3694	4573	3801
	Texas West	1860	2175	1434	2144	1919	1817	2331
	Texas Mean	2512	2381	2008	2488	2363	2506	2699
	Regional Mean	2527	2443	1990	2543	2386	2559	2776
2000	Bay City, TX	2557	2579	2194	2425	2444	2512	2362
	Beaumont, TX	1606	1966	1983	1835	2554	2240	2417
	Eagle Lake, TX	2256	2235	2239	2334	1838	1502	2543
	Ganado, TX	2349	4018	2952	2913	3292	1499	2871
	Texas East	1606	1966	1983	1835	2554	2240	2417
	Texas West	2387	2944	2462	2557	2525	1838	2592
	Texas Mean	2192	2700	2342	2377	2532	1938	2548
	GRAND Texas East	2670	2345	2732	2297	2747	2947	2534
	GRAND Texas West	2164	2221	1925	1962	1925	2156	2552
	GRAND Texas Mean	2176	2307	2114	2176	2251	2312	2458
	GRAND Regional Mean	2608	2446	2119	2356	2348	2816	2881

Table 6. Whole milling yield (%) for Bolivar and selected check varieties at several Texas locations and in Louisiana, Arkansas, and Mississippi (1996-2000).

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Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelle	Madison	Saber	Bolivar
1996	Bay City, TX	55	60	61	55	60	61	53
	Beaumont, TX	58	60	60	60	61	65	55
	Eagle Lake, TX	58	60	60	56	59	64	53
	Ganado, TX	56	57	62	57	62	62	49
	Stuttgart, AR	66	68	67	68	66	66	65
	Crowley, LA	64	66	64	60	66	64	60
	Stoneville, MS	66	65	65	66	65	49	57
	Texas East	58	60	60	60	61	65	55
	Texas West	56	59	61	56	60	62	52
	Texas Mean	57	59	61	57	61	63	53
	Regional Mean	60	62	63	60	63	62	56
1997	Beaumont, TX	57	59	56	59	49	60	50
	El Campo, TX	66	62	64	61	65	67	61
	Eagle Lake, TX	60	58	63	58	58	64	61
	Ganado, TX	65	62	63	58	66	63	59
	Stuttgart, AR	66	67	66	68	66	66	63
	Stoneville, MS	54	46	57	57	42	54	.
	Crowley, LA	61	63	66	61	53	67	52
	Texas East	57	59	56	59	49	60	50
	Texas West	64	61	63	59	63	65	60
	Texas Mean	62	60	62	59	60	64	58
	Regional Mean	61	60	62	60	57	63	58
1998	Bay City, TX	61	60	65	56	58	62	60
	Beaumont, TX	56	60	63	60	59	61	55
	Eagle Lake, TX	48	61	67	60	46	63	60
	Ganado, TX	56	60	62	58	59	63	54
	Stuttgart, AR	53	59	62	54	57	55	41
	Stoneville, MS	66	40	64	53	48	60	43
	Crowley, LA	74	66	64	.	.	68	62
	Texas East	56	60	63	60	59	61	55
	Texas West	55	60	65	58	54	63	58
	Texas Mean	55	60	64	59	56	62	57
	Regional Mean	59	58	64	57	55	62	54
1999	Bay City, TX	66	63	65	63	59	66	63
	Beaumont, TX	58	60	60	52	52	60	56
	Eagle Lake, TX	61	58	62	56	57	57	61
	Ganado, TX	63	58	63	63	58	65	53
	Stuttgart, AR	51	36	64	61	49	54	37
	Stoneville, MS	47	39	59	55	50	50	35
	Crowley, LA	59	67	64	63	64	66	66
	Texas East	58	60	60	52	52	60	56
	Texas West	63	59	63	61	58	63	59
	Texas Mean	62	60	62	59	57	62	58
	Regional Mean	58	54	62	59	56	60	53
2000	Bay City, TX	60	61	63	61	.	60	55
	Beaumont, TX	48	57	58	53	.	57	52
	Eagle Lake, TX	52	46	63	61	.	58	25
	Ganado, TX	62	65	64	63	.	63	50
	Bay City, TX	64	61	54	59	60	63	63
	Beaumont, TX	59	56	60	57	56	59	53
	Eagle Lake, TX	58	42	60	50	52	58	29
	Ganado, TX	57	63	66	63	63	66	47
	Stuttgart, AR	45	34	58	61	43	43	30
	Stoneville, MS	46	38	59	47	48	59	39
	Crowley, LA	63	69	61	67	66	68	63
	Texas East	54	57	59	55	56	58	53
	Texas West	59	56	62	60	58	61	45
	Texas Mean	58	56	61	58	58	61	47
	Regional Mean	56	54	61	58	55	59	46
	GRAND Texas East	56	59	60	57	55	61	54
	GRAND Texas West	59	59	63	59	59	63	55
	GRAND Texas Mean	59	59	62	58	58	62	55
	GRAND Regional Mean	59	58	62	59	57	61	53

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Table 7. Total milling yield (%) for Bolivar and selected check varieties at several Texas locations and in Louisiana, Arkansas, and Mississippi (1996-2000).

Year	Location	Jefferson	Gulfmont	Cypress	Dixiebelie	Madison	Saber	Bolivar
1996	Bay City, TX	69	71	70	69	70	68	70
	Beaumont, TX	67	69	67	68	68	65	68
	Eagle Lake, TX	70	71	72	71	71	64	71
	Ganado, TX	70	69	62	69	71	62	70
	Stuttgart, AR	72	74	72	72	72	66	72
	Crowley, LA	70	71	69	68	71	64	71
	Stoneville, MS	71	72	72	70	71	49	72
	Texas East	67	69	67	68	68	65	68
	Texas West	70	70	68	70	71	65	70
	Texas Mean	69	70	68	69	70	65	70
	Regional Mean	70	71	69	70	71	63	71
1997	Beaumont, TX	69	68	67	67	63	66	70
	El Campo, TX	70	70	70	69	71	70	69
	Eagle Lake, TX	70	69	71	70	70	69	71
	Ganado, TX	70	70	72	68	72	68	70
	Stuttgart, AR	72	73	72	-	72	71	73
	Stoneville, MS	67	69	68	66	65	66	64
	Crowley, LA	72	71	71	69	71	70	72
	Texas East	69	68	67	67	63	66	70
	Texas West	70	70	71	69	71	69	70
	Texas Mean	70	69	70	69	69	68	70
	Regional Mean	70	70	70	68	69	69	70
1998	Bay City, TX	67	70	69	69	68	67	69
	Beaumont, TX	64	69	67	69	61	67	67
	Eagle Lake, TX	71	72	72	67	69	70	71
	Ganado, TX	67	69	71	68	68	67	69
	Stuttgart, AR	69	69	70	68	69	68	67
	Stoneville, MS	66	70	71	70	70	67	67
	Crowley, LA	74	74	71	-	-	71	74
	Texas East	64	69	67	69	61	67	67
	Texas West	68	70	71	68	68	68	70
	Texas Mean	67	70	70	68	67	68	69
	Regional Mean	68	70	70	69	68	68	69
1999	Bay City, TX	71	71	71	71	71	68	72
	Beaumont, TX	68	69	69	66	66	68	69
	Eagle Lake, TX	71	71	71	71	69	71	72
	Ganado, TX	70	71	63	70	69	70	71
	Stuttgart, AR	71	71	70	72	71	70	71
	Stoneville, MS	66	69	68	67	67	67	66
	Crowley, LA	70	72	69	70	70	70	77
	Texas East	68	69	69	66	66	68	69
	Texas West	71	71	68	71	70	70	72
	Texas Mean	70	71	69	70	69	69	71
	Regional Mean	70	71	69	70	69	69	71
2000	Bay City, TX	69	71	70	71	-	68	71
	Beaumont, TX	62	67	66	65	-	65	66
	Eagle Lake, TX	69	70	70	70	-	68	70
	Ganado, TX	72	72	71	72	-	69	72
	Bay City, TX	69	70	69	69	69	68	70
	Beaumont, TX	68	67	68	67	66	66	68
	Eagle Lake, TX	72	70	71	68	69	68	71
	Ganado, TX	72	72	73	71	71	70	71
	Stuttgart, AR	71	71	73	72	72	70	70
	Stoneville, MS	64	68	68	67	66	66	66
	Crowley, LA	73	74	70	72	72	71	73
	Texas East	65	67	67	66	66	66	67
	Texas West	71	71	71	70	70	69	71
	Texas Mean	69	70	70	69	69	68	70
	Regional Mean	69	70	70	69	69	68	70
	GRAND Texas East	67	68	67	67	65	66	68
	GRAND Texas West	70	70	70	70	70	68	71
	GRAND Texas Mean	69	70	69	69	69	68	70
	GRAND Regional Mean	69	70	70	69	69	67	70

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Table 8. Rough, brown, and milled grain dimensions and weight of Bolivar, Gulfmont and Dixiebelle long grain rice cultivars grown at Beaumont, TX in 2000.

		Length mm	Width mm	Thickness mm	Weight g/1000 ker	L/W ratio
BOLIVAR	Rough	9.08	2.70	1.95	24.66	3.36
	Brown	6.95	2.35	1.74	19.73	2.96
	Milled	6.53	2.32	1.65	17.65	2.81
Gulfmont	Rough	9.14	2.69	1.94	25.90	3.40
	Brown	7.05	2.30	1.71	20.77	3.07
	Milled	6.93	2.21	1.68	18.72	3.14
Dixiebelle	Rough	8.38	2.51	1.84	21.20	3.34
	Brown	6.64	2.14	1.62	17.02	3.11
	Milled	6.49	2.08	1.56	15.55	3.12

Table 9. Comparison for reaction to blast\* (*Pyricularia grisea*) in inoculated greenhouse tests conducted at Beaumont, Tx (1996 - 2000).

## Blast Race/Pathotype

Year	Cultivar	IB-1	IB-1J	IB-1U	IB-1J	IB-17	IB-45	IB-46	IB-45	IB-49	IB-49	IB-54	IB-54	IC-17	IC-17	IE-1	IE-1K	IE-1K	IG-1	IG-1	IH-1	IH-1
96	Jefferson	4	3			1	1		5	4	1	0	0	1	1	0	0	1	1	0	0	0
96	Gulfmont	3	3			1	1		16	14	1	1	3	5	6	6	5	4	1	1	1	1
96	Madison	0	0			2	0		1	1	1	1	1	1	4	3	1	1	0	0	0	0
96	Kaybonnet	0	0			1	1		1	0	1	1	1	1	0	4	4	1	1	0	1	1
96	Cypress	1	1			1	1		1	1	1	1	2	3	2	4	2	2	1	1	0	1
96	Saber	1	1			1	1		1	1	1	1	0	1	1	0	0	0	1	1	1	0
96	Dixiebelle	2	2			2	2		4	3	2	4	2	4	3	3	3	1	2	0	0	0
96	BOLIVAR	1	1			1	1		1	1	1	1	2	1	1	0	0	0	0	1	0	0
97	Jefferson	2	1			1	1		6	4	1	1	2	1	1	1	1	1	1	1	1	1
97	Gulfmont	3	1			1	1	0	3	1	1	1	5	6	8	6	4	4	1	2	1	1
97	Madison	1	1			1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1
97	Kaybonnet	1	1			1	1	1	1	1	1	1	1	2	4	6	6	4	5	4	1	1
97	Cypress	2	1			1	1	0	3	1	1	1	2	4	6	4	2	1	1	1	1	1
97	Saber	1	1			1	1	1	2	3	1	1	1	2	1	1	1	1	1	1	1	1
97	Dixiebelle	3	3			1	1	1	5	3	4	2	1	4	6	3	4	4	4	4	4	1
97	BOLIVAR	5	1			1	1		3	4	1	4	1	1	1	1	1	1	1	1	1	1
98	Jefferson	2	1			1	1		6	4	1	1	2	1	1	1	1	1	1	1	1	1
98	Gulfmont	3	0	5	5				7	8	0	0	5	8	6	4	4	4	4	1	2	1
98	Madison	1	1	1	2				1	1	0	0	1	3	4	1	1	1	1	1	1	1
98	Kaybonnet	1	0	1	1				1	1	0	0	0	3	2	4	4	4	4	1	4	1
98	Cypress	1	3	7	7				4	6	0	0	5	8	4	4	4	4	6	1	1	1
98	Saber	0	1	1	1				24	27	0	0	2	1	1	1	1	1	1	1	1	1
98	Dixiebelle	4	4	4	4				4	5	5	4	6	7	4	4	4	4	3	1	1	1
98	BOLIVAR	0	0	1	1				4	2	0	0	1	1	1	1	1	1	1	1	1	1
99	Jefferson	6	6	6	6				8	8	0	0	1	1	1	1	1	1	1	1	1	1
99	Gulfmont	5	5	6	6				1	1	0	0	5	6	4	4	4	4	4	4	4	1
99	Madison	1	1	1	1				3	0	0	1	1	5	4	4	4	4	4	1	1	1
99	Kaybonnet	4	1	1	1				7	0	0	5	4	4	4	4	4	4	4	1	1	1
99	Cypress	5	6	6	6				4	0	0	3	1	2	1	1	1	1	1	1	1	1
99	Saber	3	2	3	3				4	0	0	5	4	4	4	4	4	4	4	2	2	1
99	Dixiebelle	4	3	5	4				6	7	0	5	7	6	7	4	4	4	4	4	4	2
99	BOLIVAR	1	1	2	4				6	0	0	2	1	1	1	1	1	1	5	1	1	1
00	Jefferson	4	4	4	4				6	6	0	0	1	1	1	1	1	1	1	1	1	1
00	Gulfmont	4	4	4	4				1	1	0	0	4	4	4	4	4	4	4	4	4	1
00	Madison	0	0	0	0				2	1	1	1	1	3	8	8	8	8	8	8	8	1
00	Kaybonnet	1	1	1	2				5	5	1	1	1	1	1	1	1	1	1	1	1	1
00	Cypress	4	5	6	5				6	5	1	1	3	3	3	3	3	3	3	3	3	1
00	Saber	1	1	1	1				4	5	1	1	2	1	1	1	1	1	1	1	1	1
00	Dixiebelle	3	4	4	4				4	4	1	1	4	4	4	4	4	4	4	4	4	1
00	BOLIVAR	1	1	1	1				6	0	0	2	1	1	1	1	1	1	1	1	1	1

\* Using a scale of 0=no lesions to 8=large water soaked lesions without well-defined borders

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Table 10. Comparison for reaction to blast\* (*Pyricularia grisea*) in inoculated field plots located at Beaumont, Tx (1996 - 2000).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar
96	2	6	1	5	1	1	4	1
97	4	4	4	4	1	1	5	1
98	4	6	1	6	1	1	7	1
99	1	3	1	4	2	1	6	1
99	2	4	1	1	1	1	6	1
00	5	5	1	5	1	3	6	6
00	4	5	2	5	1	3	5	4
Mean	3	5	2	4	1	2	6	2

\* Using a scale where 1= very resistant to 9=very susceptible.

Table 11. Comparison for reaction \* to sheath blight (*Rhizoctonia solani*) in inoculated field plots located at Texas, Louisiana, Mississippi, and Arkansas (1996 - 2000).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar	State
96	8	6	5	7	6	6	7	6	AR
96	8	8	8	7	7	6	8	9	LA
96	6	7	6	6	6	4	8	6	TX
97	6	4	4	4	5	5	6	3	AR
97	7	8	6	8	7	5	7	7	LA
97	5	6	8	8	7	6	6	3	TX
98	6	9	6	6	7	2	7	4	TX
98	6	8	6	7	8	5	6	7	LA
98	5	7	5	7	7	6	7	5	MS
99	4	6	5	6	6	5	6	8	TX
99	7	7	6	7	7	6	7	8	LA
99	7	8	6	8	6	6	7	8	AR
00	6	8	6	8	6	6	6	8	TX
00	7	7	6	7	7	7	8	7	LA
<b>Mean</b>	<b>6.3</b>	<b>7.0</b>	<b>5.9</b>	<b>6.8</b>	<b>6.5</b>	<b>5.4</b>	<b>6.8</b>	<b>6.3</b>	
<b>Min-Max</b>	<b>4-8</b>	<b>4-9</b>	<b>4-8</b>	<b>4-7</b>	<b>5-8</b>	<b>2-6</b>	<b>6-8</b>	<b>3-9</b>	

\* Using a scale where 1= very resistant to 9=very susceptible.

Table 12. Comparison for reaction to sheath blight (*Rhizoctonia solani*) in inoculated field plots located at Beaumont, Tx (1996-2000).

Disease Index \*

Year	Jefferson	Lemont	Cypress	Madison	Saber	Dixiebelle	Bolivar
96	5.7	7.6	8.3	6.3	.	4.1	4.0
97	3.8	7.8	4.6	.	.	7.4	4.5
98	5.7	6.5	5.8	6.6	.	7.1	6.9
99	5.5	6.8	5.6	6.6	4.5	7.1	7.5
00	1.2	5.0	1.9	5.4	1.2	6.4	7.7
Mean	3.5	6.3	5.1	6.2	2.9	5.3	5.9

\* Using a scale of 1=very resistant to 9=very resistant

Percent Yield Loss \*\*

Year	Jefferson	Lemont	Cypress	Madison	SABER	Dixiebelle	Bolivar
96	23.9	31.4	39.6	33.6	.	2.1	1.6
97	2.2	10.6	12.7	.	.	29.6	15.2
98	2.9	22.7	2.3	11.6	.	31.3	7
99	17.0	24.0	16.0	24.0	9.0	38.0	13.0
00	5.3	6.7	1.9	13.6	0.0	19.7	17.9
Mean	14.6	19.1	20.8	20.7	4.5	10.9	9.8

\*\* Based upon a comparison of yield in inoculated and uninoculated plots.

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Table 13 . Comparison for reaction to narrow brown leaf spot\* (*Cercospora janseana*) in field plots located in Texas and Louisiana (1996 - 2000).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar	State
96	5	5	4	2	1	0	2	1	LA
97	5	6	3	3	4	1	5	3	TX
98	3	3	3	4	2	0	1	2	LA
99	4	4	4	4	3	0	3	1	LA
00	4	3	2	4	1	0	3	0	LA

Mean	4	4	3	3	2	0	3	1

\* Using a scale of 1 = very resistant to 9 = very susceptible.

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Table 14. Comparison for reaction to the physiological disorder straighthead\* as induced by arsenic in field plots located in Texas and Arkansas (1996 - 1999).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar	State
96	1.5	1.0	1.0	1.0	1.0	1.0	1.0	2.0	TX
97	1.5	1.0	1.0	1.0	1.0	1.0	3.0	1.0	TX
97	5.0	5.3	6.3	5.3	5.3	4.8	6.0	4.8	AR
98	1.0	1.0	3.0	1.0	1.0	1.0	1.0	1.0	TX
99	6.0	7.0	7.0	6.0	8.0	6.0	7.0	6.0	AR
<b>Mean</b>	<b>3.0</b>	<b>3.1</b>	<b>3.7</b>	<b>2.9</b>	<b>3.3</b>	<b>2.8</b>	<b>3.6</b>	<b>3.0</b>	

\* Using a scale of 0=immune to 9= very susceptible.

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Table 11. Comparison for reaction \* to sheath blight (*Rhizoctonia solani*) in inoculated field plots located at Texas, Louisiana, Mississippi, and Arkansas (1996 - 2000).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar	State
96	8	6	5	7	6	6	7	6	AR
96	8	8	8	7	7	6	8	9	LA
96	6	7	6	6	6	4	8	6	TX
97	6	4	4	4	5	5	6	3	AR
97	7	8	6	8	7	5	·	7	LA
97	5	6	8	8	7	6	6	3	TX
98	6	9	6	6	7	2	7	4	TX
98	6	8	6	7	8	5	6	7	LA
98	5	7	5	7	7	6	7	5	MS
99	4	6	5	6	6	5	6	6	TX
99	7	7	6	7	7	6	7	8	LA
99	7	8	6	8	6	6	7	8	AR
00	6	8	6	8	6	6	6	8	TX
00	7	7	6	7	7	7	8	7	LA
<b>Mean</b>	<b>6.3</b>	<b>7.0</b>	<b>5.9</b>	<b>6.8</b>	<b>6.5</b>	<b>5.4</b>	<b>6.8</b>	<b>6.3</b>	
<b>Min-Max</b>	<b>4-8</b>	<b>4-9</b>	<b>4-8</b>	<b>4-7</b>	<b>5-8</b>	<b>2-6</b>	<b>6-8</b>	<b>3-9</b>	

\* Using a scale where 1= very resistant to 9=very susceptible.

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Table 12. Comparison for reaction to sheath blight (*Rhizoctonia solani*) in inoculated field plots located at Beaumont, Tx (1996-2000).

Disease Index \*

Year	Jefferson	Lemont	Cypress	Madison	Saber	Dixiebelle	Bolivar
96	5.7	7.6	8.3	6.3	.	4.1	4.0
97	3.8	7.8	4.6	.	.	7.4	4.5
98	5.7	6.5	5.8	6.6	.	7.1	6.9
99	5.5	6.8	5.6	6.6	4.5	7.1	7.5
00	1.2	5.0	1.9	5.4	1.2	6.4	7.7
Mean	3.5	6.3	5.1	6.2	2.9	5.3	5.9

\* Using a scale of 1=very resistant to 9=very resistant

Percent Yield Loss \*\*

Year	Jefferson	Lemont	Cypress	Madison	SABER	Dixiebelle	Bolivar
96	23.9	31.4	39.6	33.6	.	2.1	1.6
97	2.2	10.6	12.7	.	.	29.6	15.2
98	2.9	22.7	2.3	11.6	.	31.3	7
99	17.0	24.0	16.0	24.0	9.0	38.0	13.0
00	5.3	6.7	1.9	13.6	0.0	19.7	17.9
Mean	14.6	19.1	20.8	20.7	4.5	10.9	9.8

\*\* Based upon a comparison of yield in inoculated and uninoculated plots.

200200095

Table 13 . Comparison for reaction to narrow brown leaf spot\* (*Cercospora janseana*) in field plots located in Texas and Louisiana (1996 - 2000).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar	State
96	5	5	4	2	1	0	2	1	LA
97	5	6	3	3	4	1	5	3	TX
98	3	3	3	4	2	0	1	2	LA
99	4	4	4	4	3	0	3	1	LA
00	4	3	2	4	1	0	3	0	LA

Mean	4	4	3	3	2	0	3	1

\* Using a scale of 1 = very resistant to 9 = very susceptible.

200200095

Table 14. Comparison for reaction to the physiological disorder straighthead\* as induced by arsenic in field plots located in Texas and Arkansas (1996 - 1999).

Year	Jefferson	Gulfmont	Kaybonnet	Cypress	Madison	Saber	Dixiebelle	Bolivar	State
96	1.5	1.0	1.0	1.0	1.0	1.0	1.0	2.0	TX
97	1.5	1.0	1.0	1.0	1.0	1.0	3.0	1.0	TX
97	5.0	5.3	6.3	5.3	5.3	4.8	6.0	4.8	AR
98	1.0	1.0	3.0	1.0	1.0	1.0	1.0	1.0	TX
99	6.0	7.0	7.0	6.0	8.0	6.0	7.0	6.0	AR
Mean	3.0	3.1	3.7	2.9	3.3	2.8	3.6	3.0	

\* Using a scale of 0=immune to 9= very susceptible.

EXHIBIT E

STATEMENT OF THE BASIS OF OWNERSHIP

R4D 9/16/04  
NAME OF APPLICANT(S)

USDA-ARS

Anna Myers McClung

4. ADDRESS (Street and Box or R.F.D. No., City, State and Zip and County)

USDA-ARS  
1509 Aggie Drive  
Beaumont, TX 77713

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

2. TEMPORARY DESIGNATION  
OR EXPERIMENTAL NUMBER

TX 5012

3. VARIETY NAME

Bolivar

5. TELEPHONE (include area code)

409-752-5221, ext. 2234

6. FAX (include area code)

409-752-5720

7. FINGER NUMBER

200 200 095

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain

YES

9. Is the applicant (individual or company) a U.S. National or a U.S. based company? If no, give name of country

YES

NO

10. Is the applicant the original owner?  YES  NO If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

YES  NO If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

YES  NO If no, give name of country

11. Additional explanation on ownership (if needed, use the reverse for extra space):

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 6 minutes per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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